

such a system, but we should have expected to hear from him a vigorous denunciation of it, in the place of such a reply as he gave. Dr. Arnott, we may note, is of opinion that there cannot be a perfect system of warming and ventilating, in a building having separate rooms, if there is a deficiency in respect to any one of the following six particulars:—

"Firstly. Means of moving through the building steadily the definite quantity of pure air known to be required.

Secondly. Means of duly distributing this air to the different rooms and compartments.

Thirdly. Means of properly diffusing the air in each room.

Fourthly. Fit means of discharging the vitiated air from the room.

Fifthly. Means of giving to the air the fit temperature.

And lastly. Means of giving the fit moisture."

Further, he thinks, that the more the apparatus is rendered self-regulating, or independent of the constant watching and interference of attendants, the better it is likely to be, both as to performance and economy.

We may add a crumb of practical information from Mr. Gurney's evidence. That gentleman thinks that "the quality of the air (in the building), wherever it is objectionable, is from the horizontal pipes"—of which he has "a great horror." When the heating-pipes are vertical, he says, "the air, the moment it becomes warm, strikes against the side of the vertical pipe, and escapes sideways by convection before it has time to arrive at a high temperature;" whereas in the horizontal pipes air forms an eddy above, "and remains for a short time in a sluggish state, almost a state of rest, and thus becomes overheated." Messrs. Daukes and Price follow our views to a considerable extent. They recommend, in a report given in the Appendix,—

"In the first place, that the present practice of moving the air through the Houses by mechanical power only, should be abandoned; and that for the future the chief reliance (except in the summer months) should be upon the natural power of the spontaneous upward movement.

Secondly.—That the downward movement of the air-currents shall be entirely abandoned, and with this 'noxious fallacy' should also be relinquished the fallacious attempt to produce and sustain such opposite and contrary forces as the plenum and vacuum principles of ventilation, in the same rooms and at the same time.

Thirdly.—All the present air-passages, whether for the transit of fresh or foul air, should be reconstructed, or at all events so remodelled as to combine, in one appropriate and uniform system, a series of free and unobstructed, but closed, air-channels, arranged in strict accordance with the natural upward tendency of warm air-currents, and framed with a scrupulous regard to the greatest possible uniformity of form, and observance of those definite and proportionate relative areas between the main and branch flues, without which we do not hesitate to assert that no system of ventilation, however skilfully devised in other respects, can be protected from those adverse and disturbing influences which must peril the success of any scheme whatever.

Fourthly.—We advise that the use of steam at 230 deg. or even 212 deg. as a medium of heat for giving temperature to the air-warming surfaces, should be abandoned, and hot water, at a maximum heat of 170 deg. be substituted. Steam over-heats and over-dries the air, and admits of no gradual control over the extensive range of temperature that lies below 212 deg. Hot water can be employed at any desired degree of heat below the boiling-point, and admits of the most minute and gradual control over that range of temperature which lies below the degree of 212.

Fifthly.—We recommend that the air-warming surfaces should be vertically, and not horizontally arranged, and that they should be so altered from their present form as to spread out the air and water in thin and numerous alternating streams; the first condition being essential for the full and free development of the natural ascending movement, and the second material for the rapid abstraction by the cold air of the caloric of the heated water.

Sixthly and lastly.—We advise, that in the manipulation of any system provided for warming and ventilating the Houses of Parliament, the attempt—the worse than useless attempt—to meet the continual and conflicting wishes of individual members, in respect of temperature, should be discontinued; for we are convinced that the operation of no system whatever, however perfectly carried out, can be made generally satisfactory under such a course of proceeding."

Mr. Bardwell, in a sensible letter printed in the Appendix, takes the same view of "the attempt to bring in fresh air by a ceiling, and cause the emanations to be breathed or inhaled over and over and over again!" He touches, too, a question to which we have before now referred, the effect of currents of air on hearing:—

"Nor is this all; for both in the House of Lords and in the House of Commons, provision being made for bringing in air from the top, from the bottom, and from the sides, commingling together like the waters of a maelstrom, up and down and round and round, the air is in that state of commotion that the sound of the voice cannot radiate. Throw a stone into the placid waters of a lake, and the effect will be seen in a series of concentric circles. Sir Isaac Newton says, that sound is communicated in a similar manner. But throw a stone into a maelstrom, and no such effect can be produced; hence the acoustical property of the Houses is rather destroyed by the mode of ventilation than by architectural defects."

Mr. John Leake hits more than one right nail on the head in his evidence. He says justly, that often while the thermometer tells one tale, the human body tells another, because of the velocity with which the air is made to pass over the latter.

Again, he objects to the mode of egress provided in the House for the vitiated air,—longitudinal apertures less than an inch wide all round the panels:—"I think this egress most objectionable: the ascending current strikes against the whole bottom of the panel, causing a general reverberation, producing eddies and currents, consequently permitting only a partial escape of the vitiated air; the remainder of which, by this reverberation, is caused to diffuse itself again and return into the general atmosphere of the room."

He, too, would "shut off every sort of connection as to descending currents of air, which I hold to be most dangerous to health. I should take example from all previous failures. Sir Christopher Wren failed, Dr. Desaguliers failed, Sir Humphrey Davy failed, all from having too small apertures for the vitiated atmosphere to escape; and I believe that one of the great causes of the present failure is what I have already alluded to, reverberation from the ascending current on the bottom of these panels." He would take away all the panels, and said he felt satisfied they would be heard better, besides being better ventilated, because they would be speaking in the calmness of a summer day's atmosphere, instead of, as now in reverberating currents.

In closing our notice, we must say we have no sympathy with those who talk about partially pure air, and improving the vitiated air by the admission of fresh. Once breathed, it must be got rid of, and, in order to get rid of it, it must be allowed to go off at once while it is in a condition to ascend: cool it and it will remain by you until it has again been warmed.

STRIKE IN THE IRON TRADE.—The puddlers of South Staffordshire have struck for an advance of 1s. 6d. a ton on their wages. The masters have met in Birmingham, and have resolved to refuse the demand.

ST. WREN'S. No. 11

Unless you deem it necessary to convert the title above, like that of my former letter, and so save me the trouble, I would explain that I choose it in deference to public opinion, and to the view of this building that seems to pervade all discussions of its treatment; viz. that the object paramount to all others is to enhance its apparent size, or richness, to display it and its author's genius to the best advantage, and to avoid, at any sacrifice, whatever might interfere with any pictorial "effect," that its emptiness may have occasioned, or alter any thing that Wren did, or permitted, or that has any how obtained or palmed itself off under his authority. Now, in this case, the end of its existence must be the glorification either of itself, its owners, or its author, whose monument, according to this view, it literally is; not in the secondary sense claimed by the famous epitaph, but primarily and simply, just as Achmet's mosque, Henry VIII's Chapel, or Sir John Soane's museum, are theirs. But if so, surely "St. Paul's Church" is a misnomer. We should call it *St. Wren's*, and not a church (which the learned tell us is short for KYPIOT ouros) at all.

Now, accepting for the nonce this idea of the building's purpose, I submit that it will be better answered,—that Wren's glory, and the city's and nation's, will be more truly consulted, by aiming at what he would have done, than by restoring what he or his fashion-enamored masters allowed fashion to wring from them; that it will be better consulted by using our reason and added experience than by surrendering both to the authority of chance, and chance-governed fashions and precedents; that Wren's memory, in short, will be more revered and honoured by treating his monument as a living useful thing, a reality, and part of the live world, than as a dead obstructive carcass,—that he meant it (as all real architects have meant their works) to be (as all pieces of real architecture, church or barn, exchange or shop, have been) living, alterable, and adaptable to the changing times; alterable immediately on its completion, had it failed to answer some part of its immediate purpose;—that such immediate alteration would have annoyed him, indeed, as much as it would Mr. Tit, or any other honest creator of a public building,—have caused him annoyance at himself, not at the correctors of his work;—but that alterations to preserve or extend the life and reality of his work in better times than his own, and assimilate it more to his thwarted intentions, would not annoy but please him; and I hope to carry to his feet the news that such have been at least begun, and bear him thank God that they have.

Now, with regard to internal decorations, it appears to be Archdeacon Hale's opinion that until the dome paintings be restored, "no person will be thoroughly able to judge what ought to be done to the rest of the building." That is to say, in other words, he believes we have no architect,—not a man able to design us the decorations,—to know how half of them should be, till the other half have been executed. Now, if this be so, I would humbly submit that we are not in a condition to touch the work at all,—and that the only rational plan is to leave it unattempted, till we can satisfy ourselves that we have some one who knows what to do, before beginning to do it. The experimental mode of proceeding may be made to serve in a Crystal Palace or a Tubular Bridge, or wherever there is a real or supposed necessity for a work you have no one able to design. Sir Joseph or Mr. Stephenson may trust to have their works tried, if ties are found wanting, and roofed, if roofs are found wanting: the science and thought of the general public will run to their aid, and keep their works up and useable, design them how they may. It is widely different when you leave the province of bare necessity; and as pure decoration like this can never be matter of necessity, as the evidence of design (the opposite to chance and makeshifts and patchwork) is essential to beauty (if not the very measure thereof), I really do not see how it is possible for beauty to be produced without an architect,—i.e. a chief artificer,—one, and one only. 1